***** CONFIDENTIAL *****
***** PREDECISIONAL DOCUMENT *****

SUMMARY SCORESHEET
FOR COMPUTING PROJECTED HRS SCORE

SITE NAME: Witco Golden Bear Division Refinery

CITY, COUNTY: Oildale, Kern

EPA ID #: CAD002904886 EVALUATOR: K. Zavitz

PROGRAM ACCOUNT #: FCA1532RAA DATE: 12/17/90

Lat/Long: _____ T/R/S: _____

THIS SCORESHEET IS FOR A: RCRA PA ✓ SSI ____ LSI ____

SIRe ____ PA Redo ____ Other (Specify) _____

RCRA STATUS (check all that apply):

✓ Generator ___ Small Quantity Generator ___ Transporter ___ TSDF

___ Not Listed in RCRA Database as of (date of printout) / /

STATE SUPERFUND STATUS:

___ BEP (date) / / ___ WQARF (date) / /

___ No State Superfund Status (date) / /

| | S pathway | $S^2$ pathway |
|---|---|---|
| Groundwater Migration Pathway Score ($S_{gw}$) | 38.27 | 1464.59 |
| Surface Water Migration Pathway Score ($S_{sw}$) | .17 | .03 |
| Soil Exposure Pathway Score ($S_s$) | 0* | 0* |
| Air Migration Pathway Score ($S_a$) | 1.49 | 2.22 |
| $S^2_{gw} + S^2_{sw} + S^2_s + S^2_a$ | | 1466.84 |
| $(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4$ | | 366.71 |
| $\sqrt{(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4}$ | | 19.15 |

*Pathways not evaluated (explain): The soil exposure pathway is not evaluated because soil is contaminated with petroleum by-products, which are CERCLA-exempt under the Petroleum Exclusion Act.

>/rhrs 14-Nov-1990

## GROUNDWATER MIGRATION PATHWAY SCORESHEET

**Factor Categories and Factors**

| | Likelihood of Release | Maximum Value | Projected Score | Rationale | Data Qual. |
|---|---|---|---|---|---|
| 1. | Observed Release | 550 | 550 | 1 | |
| 2. | Potential to Release | | | | |
| | 2a. Containment | 10 | 10 | 2 | |
| | 2b. Net Precipitation | 10 | 3 | 3 | |
| | 2c. Depth to Aquifer | 5 | 3 | 4 | |
| | 2d. Travel Time | 35 | 25 | 5 | |
| | 2e. Potential to Release [Lines 2a x (2b+2c+2d)] | 500 | 310 | | |
| 3. | Likelihood of Release (Higher of lines 1 or 2e) | 550 | 550 | | |
| | **Waste Characteristics** | | | | |
| 4. | Toxicity/Mobility | a | 100 | 6 | |
| 5. | Hazardous Waste Quantity | a | 10,000 | 7 | |
| 6. | Waste Characteristics (lines 4 x 5, then use Table 2-7) | 100 | 18 | | |
| | **Targets** | | | | |
| 7. | Nearest Well | 50 | 20 | 8 | |
| 8. | Population[d] | | | | |
| | 8a. Level I Concentrations | b | | | |
| | 8b. Level II Concentrations | b | | | |
| | 8c. Potential Contamination | b | 243.9 | 9 | |
| | 8d. Population (lines 8a+8b+8c) | b | | | |
| 9. | Resources | 5 | 5 | 10 | |
| 10. | Wellhead Protection Area | 20 | | | |
| 11. | Targets (lines 7+8d+9+10) | b | 318.9 | | |
| | **Likelihood of Release** | | | | |
| 12. | Aquifer Score [Lines 3 x 6 x 11)/82,500][c] | 100 | 38.27 | | |

**Groundwater Migration Pathway Score**

| | | | |
|---|---|---|---|
| 13. | Pathway Score (Sgw), (highest value from line 12 for all aquifers evaluated) | 100 | 38.27[c] |

a Maximum value applies to waste characteristics category.
b Maximum value not applicable.
c Do not round to the nearest integer.
d Use additional tables.

/rhrs Aquifer Evaluated _____ 14-Nov-19

## GROUNDWATER PATHWAY CALCULATIONS

### 8. Population

**Actual Contamination**

| Well Identifier | Contaminant Detected | Concentration (Note Units) | Benchmark | (A) Apportioned Population Well Serves | (B) Level* Multip. | (A x B) |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | Sum (A/B) Level I | | |
| | | | | Sum (A/B) Level II | | |

* Multipliers
- Level I = 10
- Level II = 1

**Potential Contamination**

| Distance (miles) | Total # of Wells within Distance Ring | Total Population Within Distance Ring | Distance-Weighted Population Values "Other Than Karst" (Table 3-12)* (A) |
|---|---|---|---|
| 0 to 1/4 | | | |
| >1/4 to 1/2 | | | |
| >1/2 to 1 | | | |
| >1 to 2 | 12 | 27,000 | 2939 |
| >2 to 3 | | | |
| >3 to 4 | | | |
| | | Sum (A) | 2,939 |

Potential contamination = $\frac{\text{Sum (A)}}{10}$ = 293.9

* For drinking water wells that draw from a karst aquifer, see the Distance-Weighted Population Values for "Karst" in Table 3-12.

## SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors

**DRINKING WATER THREAT**

| | Likelihood of Release | Maximum Value | Projected Score | Rationale | Data Qual. |
|---|---|---|---|---|---|
| 1. | Observed Release | 550 | 0 | 11 | |
| 2. | Potential to Release by Overland Flow | | | | |
| | 2a. Containment | 10 | 10 | 12 | |
| | 2b. Runoff | 25 | 3 | 13 | |
| | 2c. Distance to Surface Water | 25 | 6 | 14 | |
| | 2d. Potential to Release by Overland Flow [lines 2a x (2b+2c)] | 500 | 90 | | |
| 3. | Potential to Release by Flood | | | | |
| | 3a. Containment (Flood) | 10 | 10 | | |
| | 3b. Flood Frequency | 50 | 7 | 15 | |
| | 3c. Potential to Release by Flood (lines 3a x 3b) | 500 | 70 | | |
| 4. | Potential to Release (Lines 2d+3c, subject to a maximum of 500) | 500 | 160 | | |
| 5. | Likelihood of Release (Higher of lines 1 or 4) | 550 | 160 | | |
| | **Waste Characteristics** | | | | |
| 6. | Toxicity/Persistence | a | 10 | 6 | |
| 7. | Hazardous Waste Quantity | a | 10,000 | 7 | |
| 8. | Waste Characteristics (lines 6 x 7, then assign a value from Table 2-7) | 100 | 18 | | |
| | **Targets** | | | | |
| 9. | Nearest Intake | 50 | 0 | 14 | |
| 10. | Population[d] | | | | |
| | 10a. Level I Concentrations | b | | | |
| | 10b. Level II Concentrations | b | | | |
| | 10c. Potential Contamination | b | 0 | 17 | |
| | 10d. Population (lines 10a + 10b+10c) | b | | | |
| 11. | Resources | 5 | 5 | 18 | |
| 12. | Targets (lines 9+10d+11) | b | 5 | | |
| | **Drinking Water Threat Score** | | | | |
| 13. | Drinking Water Threat [(Lines 5 x 8 x 12)/82,500, subject to a maximum of 100] | 100 | .17 | | |

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## SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET (CONTINUED)

**Factor Categories and Factors**

**HUMAN FOOD CHAIN THREAT**

| | Likelihood of Release | Maximum Value | Projected Score | Rationale | Data Qual. |
|---|---|---|---|---|---|
| 14. | Likelihood of Release (Same value as line 5) | 550 | 160 | | |
| | **Waste Characteristics** | | | | |
| 15. | Toxicity/Persistence/ Bioaccumulation | a | 200 | | |
| 16. | Hazardous Waste Quantity | a | 18 | | |
| 17. | Waste Characteristics (Toxicity/Persistence x Hazardous Waste Quantity x Bioaccumulation, then assign a value from Table 2-7) | 1,000 | 3 | | |
| | **Targets** | | | | |
| 18. | Food Chain Individual | 50 | 0 | 19 | |
| 19. | Population[d] | | | | |
| | 19a. Level I Concentrations | b | | | |
| | 19b. Level II Concentrations | b | | | |
| | 19c. Potential Human Food Chain Contamination | b | | | |
| | 19d. Population (lines 19a+19b+19c) | b | 0 | 19 | |
| 20. | Targets (lines 18+19d) | b | | | |
| | **Human Food Chain Threat Score** | | | | |
| 21. | Human Food Chain Threat (Lines 14 x 17 x 20, subject to a maximum of 100) | 100 | 0 | | |

## SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET (CONTINUED)

Factor Categories and Factors

**ENVIRONMENTAL THREAT**

| | Liklelihood of Release | Maximum Value | Projected Score | Rationale | Data Qual. |
|---|---|---|---|---|---|
| 22. | Likelihood of Release (Same value as line 5) | 550 | | | |
| | **Waste Characteristics** | | | | |
| 23. | Ecosystem Toxicity/Persistence/ Bioaccumulation | a | | | |
| 24. | Hazardous Waste Quantity | a | | | |
| 25. | Waste Characteristics (Ecosystem Tox./Persistence x Hazardous Waste Quantity x Bioaccumulation, then assign a value from Table 2-7) | 1,000 | | | |
| | **Targets** | | | | |
| 26. | Sensitive Environments[d] | | | | |
| | 26a. Level I Concentrations | b | | | |
| | 26b. Level II Concentrations | b | | | |
| | 26c. Potential Contamination | b | | | |
| | 26d. Sensitive Environments (lines 26a+26b+26c) | b | | | |
| 27. | Targets (Value from line 26d) | b | | | |
| | **Environmental Threat Score** | | | | |
| 28. | Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a maximum of 60) | 60 | | | |

**SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED**

| | | | |
|---|---|---|---|
| 29. | Watershed Score [(Lines 13+21+28), subject to a maximum of 100] | 100 | [ ][c] |

**SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE**

| | | | |
|---|---|---|---|
| 30. | Component Score (Sof) (Highest score from Line 29 for all watersheds evaluated, subject to a maximum of 100) | 100 | [ ][c] |

a Maximum value applies to waste characteristics category.
b Maximum value not applicable.
c Do not round to the nearest integer.
d Use additional tables

## AIR MIGRATION PATHWAY SCORESHEET

**Factor Categories and Factors**

| | Likelihood of Release | Maximum Value | Projected Score | Rationale | Data Qual. |
|---|---|---|---|---|---|
| 1. | Observed Release | 550 | | | |
| 2. | Potential to Release[e] | | | | |
| | 2a. Gas Potential | 500 | 450 | 20 | |
| | 2b. Particulate Potential | 500 | | | |
| | 2c. Potential to Release (higher of lines 2a and 2b) | 500 | | | |
| 3. | Likelihood of Release (higher of Lines 1 or 2c) | 550 | 450 | | |
| | **Waste Characteristics** | | | | |
| 4. | Toxicity/Mobility | a | 10 | 6 | |
| 5. | Hazardous Waste Quantity | a | 18 | 7 | |
| 6. | Waste Characteristics (lines 4 x 5, then use Table 2-7) | 100 | 3 | | |
| | **Targets** | | | | |
| 7. | Nearest Individual | 50 | 50 | 21 | |
| 8. | Population[e] | b | | | |
| | 8a. Level I Concentrations | b | | | |
| | 8b. Level II Concentrations | b | | | |
| | 8c. Potential Contamination[e] | b | 33.3 | 22 | |
| | 8d. Population (8a+8b+8c) | b | 33.3 | | |
| 9. | Resources | 5 | 5 | 23 | |
| 10. | Sensitive Environments[e] | | | | |
| | 10a. Actual Contamination | c | | | |
| | 10b. Potential Contamination | c | 2.7 | 27 | |
| | 10c. Sensitive Environments (lines 10a+10b) | c | | | |
| 11. | Targets (Lines 7+8d+9+10c) | b | 91 | | |

**Air Pathway Migration Score**

| | | | | |
|---|---|---|---|---|
| 12. | Air Pathway Score (Sa) [(lines 3 x 6 x 11)/82,500] | 100 | 1.49[d] | |

a Maximum value applies to waste characteristics category.
b Maximum value not applicable.
c No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to a maximum of 60.
d Do not round to nearest integer.
e Use additional tables.

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## AIR PATHWAY CALCULATIONS

### 2. Potential to Release

**Gas Potential to Release**

| | Source Type (Table 6-4) | Gas Containment Factor Value (Table 6-3) | Gas Source Type Factor Value (Table 6-4) | Gas Migration Potential Factor Value (Table 6-7) | Sum | Gas Source Value |
|---|---|---|---|---|---|---|
| | | (A) | (B) | (C) | (B+C) | A x (B+C) |
| 1. | API Separator | 10 | 28 | 17 | 45 | 450 |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| | Gas Potential to Release Factor Value (Select the highest Gas Source Value) | | | | | 450 |

**Particulate Potential to Release**

| | Source Type (Table 6-4) | Particulate Containment Factor Value (Table 6-9) | Particulate Source Type Factor Value (Table 6-4) | Particulate Migration Potential Factor Value (Figure 6-2) | Sum | Particulate Source Value |
|---|---|---|---|---|---|---|
| | | (A) | (B) | (C) | (B+C) | A x (B+C) |
| 1. | API Separator | 0 | 0 | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| | Particulate Potential to Release Factor Value (Select the highest Particulate Source Value) | | | | | 0 |

## AIR PATHWAY CALCULATIONS (CONTINUED)

### 8. Potential Contamination

| Distance (miles) | | (A) Distance-Weighted Population Value (Table 6-17) |
|---|---|---|
| On site (0) | TE | |
| >0 to 0.25 | 712 | 131 |
| >0.25 to 0.5 | 1,314 | 88 |
| >0.5 to 1 | 2,076 | 26 |
| >1 to 2 | 8,134 | 27 |
| >2 to 3 | 15,047 | 38 |
| >3 to 4 | 19,387 | 23 |
| >4 | | |
| | Sum of (A) = | 333 |

Air Potential Contamination Factor Value = $\frac{\text{Sum of (A)}}{10}$ = 33.3

### 10. Sensitive Environments

**Actual Contamination**

| Wetland or Type of Sensitive Environment | (A) Sensitive Environment Rating Value (Table 4-23) | (B) Wetland Rating Value (Table 6-18) | (A + B) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Actual Contamination Factor Value [sum (A + B)] _____

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## AIR PATHWAY CALCULATIONS (CONTINUED)

**Potential Contamination**

| Wetland or Type of Sensitive Environment | (A) Sensitive Environment Rating Value (Table 4-23) | (B) Wetland Rating Value (Table 6-18) | Distance (miles) | (DW) Distance Weights (Table 6-15) | DW x (A + B) |
|---|---|---|---|---|---|
| Leopard Lizard | 100 | | <3 | .0014 | .14 |
| San Joaquin Fox | 100 | | 0-1/4 | .25 | 25 |
| Callistoderma | 75 | | <1 | .0051 | .3825 |
| Hoovers eriastrum | 50 | | <1 | .0051 | .255 |
| SW Pond Turtle | 50 | | <4 | 0 | 27 |
| | | | | Sum DW x (A + B) | 27 |

Potential Contamination
Sensitive Environments Factor Value = $\frac{\text{Sum DW x (A + B)}}{10}$ = $\frac{2.7}{}$

| | | | | |
|---|---|---|---|---|
| Wooly Threads | 50 | <2 | .0023 | .115 |
| Bakersfield Cactus | 50 | <.5 | .016 | .8 |

WITCO Chemical Corporation, Golden Bear Division

References and Rationale

Sources

There are three sources that need to be evaluated.

a. There are 7 shallow wells (20 feet deep) that have accepted stormwater runoff since their construction in 1968. The testing around these wells shows evidence of hydrocarbon contamination. These wells are in the areas of asphalt, lube oil, and diesel bulk storage tanks. Runoff would have originated from the refining process. Since all of these products are excluded under the CERCLA Petroleum Exclusion Act, they are not considered as a source for groundwater pathway.

b. There are two deep injection wells that have accepted non-CERCLA refinery wastes, wastewater, and spent clays since their construction in 1986. This would not be considered a source except for the fact that laboratory wastes discarded down the lab sink (spent toulene) were sent through the API Separator and then mixed with the spent clays and injected down the deep wells. These wastes are considered RCRA hazardous wastes. Thus, the entire volume injected into the wells can be used for waste quantity. The two different sources related to this waste that may be evaluated are the deep injection wells and the API Separator. The injection wells are not available to surface water, air or soil exposure pathways. Waste injected in the wells must migrate upward to contaminate the groundwater aquifer. The API Separator is potentially available to surface water, groundwater, air and soil exposure pathways since the API Separator does not have total containment.

1. There has not been an observed release to groundwater from the API separators. There is a release from the injection wells, however, the contaminants must migrate upward.

2. Neither the API separator or the injection wells have total containment.

3. Net Precipitation: The value assigned for this area according to the Final Model is 3. Net precipitation is 4.7933 inches.

4. Depth to aquifer:
   According to Ken Turner of the Kern County Water Agency, the site lies in the southeastern portion of the San Joaquin Valley. Groundwater beneath the site starts at approximately 50 feet below ground surface (bgs). A 1959 U.S. Geological Survey report indicates that this single aquifer reaches a maximum depth of approximately 1,500 feet bgs. According to Kern County Water Agency, the vadose (unsaturated) zone in this area was formed by alluvial fan deposits

from the Kern River and consists primarily of sand with some silt and lenticular clay, which extends no more than several feet laterally. This vadose zone is highly permeable.

According to the Pacific Environmental Group, there are zones of perched water 10 to 20 feet above the unconfined aquifer. Studies have not yet shown if the perched water and the unconfined aquifer are interconnected.

5. FIT estimates that uniform sands should be more permeable than well graded sands because well graded sands are different sizes and may fit together more closely.

6. TOXICITY
Toxicity values for chromium, lead, toluene, TCE, and acetone were compared, and the highest values were used.

7. Waste Quantity:
The waste quantity from the injection wells: 3,000,000 gallons since 1986. 3,000,000 gallons x (1 cubic yard/200 gallons) = 15,000.

8. The nearest private water well is approximately .25 miles away.

9. Drinking water from the Oildale Mutual Water Company is supplied by groundwater and supplemented by imported from the Kern River and California Aqueduct system. There are 12 wells in this system. These two sources are commingled and serves approximately 24,000 people.

10. Due to the large production of agriculture in Kern County, FIT estimates that groundwater is used for irrigation as well as drinking water supplies.

11,12. There is no documentation of an observed release to surface water; however, there is a potential for a release due to the lack of containment of the API Separator and the close proximity of surface water.

13. The 2-year, 24-hour rainfall is 1.6 inches. According to a Soil Survey of Kern County, the runoff potential is moderate for the type of soil at the site. Predominant land use is for oil refineries.

14. Beardsley Canal borders the Witco refinery property. It is a source for irrigation water, not drinking water. The canal is only bermed with a levy for part of the site, thus, it is possible for runoff to flow into the canal. The Kern River is approximately 0.50 miles south and downgradient of the site. The river is bermed, and thus the surface water of concern is the Beardsley Canal.

15. There is not certification for flood containment. The part of the property that is not refinery is in the 100 year flood plain.

16,17. The Beardsley Canal, the surface water of concern, is not used for drinking water.

According to the USGS Water-Data Report, the Kern River flow rate is approximately 390 cfs. According to Kern County Water Agency, surface water from the Kern River is sold to water purveyors serving the Bakersfield area. Thus, the entire population of Bakersfield (169,501) and Oildale receive Kern River water. However, Kern River water is only used in wet years, as an alternative source, thus it has not been used for the past few years.

According to the Oildale Mutual Water Company, surface water is also imported from the California Aqueduct.

18. The Beardsley Canal is used for irrigation.

19. The Beardsley Canal is not used for commercial fishing.

20. There is no observed contamination of hazardous wastes in the soil. There is no documentation to determine an observed release to air; however, there is a potential for an observed release from the API Separator because it is not covered.

21,22. The nearest individuals would be on-site workers. Figures used for each population ring were provided by Bill Larson of the Kern County Planning Department.

23. See table. Estimates on land use are based upon information from the USGS maps; Oildale and Oil Center quadrangles.

24. According to the Department of Fish and Game and the NDDB, there are several sensitive environments within a 4-mile radius of the site.